Topaz Butte, five miles north of Florissant, marks the southern limit of the "crystal beds" whence have come most of the specimens labelled *Pike's Peak*. The largest phenacite ever found in this locality is a rough lenticular crystal about 15 mm. in diameter.—The norites of the Cortlandt series on the Hudson River, near Peekskill, New York, by George H. Williams. In continuation of his memoir on the peridotites of the Cortlandt series (*American Journal of Science*, 1886, p. 26) the author here begins a petrographic description of the massive rocks of this system. The present paper deals with the non-chrysolitic rocks, norite proper and hornblende norite. He designates all rocks in which one-half or more of the non-feldspathic constituents are hypersthene as norite, and names varieties of this after the prevailing accessory component.—A method for subjecting living protoplasm to the action of different liquids, by George L. Goodale. An apparatus is described by means of which the necessity is obviated of transferring specimens from the litre-flask to the stage of the microscope, all handling being thus avoided, while the object can be placed under the action of as large a quantity of liquid as may be desirable.—On the topaz from the Thomas Range, Utah, by A. N. Alling. The topaz crystals here under examination are from the cabinet of Prof. Brush, vary in length from 3 mm. to 10 mm., and are perfectly clear and colourless.—On a simple and convenient form of water battery, by Henry A. Rowland. A simple, convenient, and cheap form of water battery is described, which the author has had in use for many years.

*Bulletin des Sciences Mathématiques*, tome x. December 1886, tome xi. January 1887, Paris.—We single out these two recently issued parts, as they contain papers on subjects intimately connected with notices of Greek geometry, which we have from time to time communicated to NATURE when giving an account of Dr. Allman's contributions to *Hermathena*. In the *Mélanges* of the earlier number M. Paul Tannery has two notes: one of nine pages, entitled "Démocrite et Archytas" (see Gow's "History," p. 129, and NATURE, vol. xxxiv. p. 548); the other, of eleven pages, on "Les Géomètres de l'Académie." The later part has an article of, twelve pages, by the same writer, on "La Technologie des Éléments d'Euclide." All three are quite up to M. Tannery's well-known excellent form for thoroughness of research and soundness of inference. The rest of the matter consists as usual of reviews (*inter alia*, of the French translation of Clerk Maxwell's "Electricity and Magnetism" and Mr. Greenhill's "Differential and Integral Calculus"), and of useful abstracts of papers in the various Continental and British mathematical journals.

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## *SOCIETIES AND ACADEMIES*

### LONDON

**Royal Society**, February 24.—"Problems in Mechanism regarding Trains of Pulleys and Drums of Least Weight for a given Velocity Ratio." By Prof. H. Hennessy, F.R.S.

As trains of wheels, pulleys, and drums are frequently employed in machinery for the transformation of large and small velocities of rotation, it appeared to the author desirable to inquire into the conditions which would favour the greatest economy of weight of the parts forming such trains. Eighty years since Dr. Thomas Young had arrived at a theorem for the minimum number of teeth in a train of wheels and pinions with a given velocity ratio, and when the pairs of wheels and pinions are similar. By investigating the question of minimum volume or minimum weight of trains the author has been led to the following results, which are fully demonstrated in his paper: namely, that for a train of cylindrical pulleys composed of similar pairs the ratio of the diameter of a large to that of a small pulley should be as 19 to 10. For drums composed of hoops supported by disks of the same thickness, and with the breadth of each hoop equal to the radius of the small drum, the ratio of the diameters should be 11 to 5. If the hoop was supported by spokes whose volume taken together would be half the volume of a complete disk, the ratio would be 51 to 20. With regard to a train of pulleys, it was shown that a single pair possessing the same velocity ratio as a series with the ratio of diameters found for minimum volume, the latter would be considerably less than the former. Thus, with five pairs whose velocity ratio would be nearly 24¾, the volume would be less than the 1/26 of a single pair possessing the same velocity ratio. A model constructed in brass of such a train, with all the large pulleys 1·9 inches in diameter, and all the small 1 inch, weighed 18·34 ounces. A train of four pairs of drums illustrative of the last problem solved weighed 16·788 ounces, the large drums being 2·55 inches, and the small 1 inch diameter, while all the hoops were half an inch broad. The velocity ratio of this train is 42·2825, or a little more than 42¼.

March 3.—"The Etiology of Scarlet Fever." By E. Klein, M.D., F.R.S., Lecturer on General Anatomy and Physiology at the Medical School of St. Bartholomew's Hospital, London.

The investigation, the results of which I now record, was commenced at the end of December, 1885. It arose out of an inquiry into the prevalence of scarlatina in different quarters of London, undertaken by the Medical Department of the Local Government Board as a part of its business of investigating local epidemics. That inquiry had demonstrated milk from a farm at Hendon as the cause of the scarlatina, and had adduced strong circumstantial evidence that the scarlatina had been distributed, not in the whole, but in certain sections of the Hendon milk, and further that the ability of the sections of milk service to convey the disease had been related to a malady affecting particular cows. This evidence against particular cows at the Hendon farm could not and did not aim at furnishing direct and definite proof of the connection of this cow disease with scarlet fever of man, for the inductive methods usually employed by the Medical Department of the Local Government Board when applied to inquiries about epidemic spread of scarlatina can for obvious reasons yield but circumstantial evidence. As on various former occasions, so also on this, the Medical Department sought to put the above conclusions to the test of scientific experiment. This task was delegated to me by the Board. The first part of this work has been published in the recently issued volume of the Reports of the Medical Officer of the Local Government Board for 1885-86. I have therein shown that the suspected cows from the Hendon farm that had been made the object of special study, showed besides a skin disease—consisting in ulcers on the udder and teats, and in sores and scurfy patches and loss of hair on different parts of the skin—also a general disease of the viscera, notably the lungs, liver, spleen, and kidney, which resembled the disease of these organs in acute cases of human scarlatina. I have further shown that the diseased tissues of the ulcers on the teats and udder produced on inoculation into the skin of calves a similar local disease, which in its incubation and general anatomical characters proved identical with the ulceration of the cow; and further, that from the ulcers of the cow a species of micrococcus was isolated by cultivation in artificial nutritive media, which micro-organism in its mode of growth on nutritive gelatine, on Agar-Agar mixture, on blood serum, in broth, and in milk, proved very peculiar and different from other species of micrococci hitherto examined. With such cultivation of the micrococcus I have produced by subcutaneous inoculation in calves a disease which in its cutaneous and visceral lesions (lung, liver, spleen, and kidney) bears a very close resemblance both to the disease that was observed in the Hendon cows as well as to human scarlatina.

The second part of the work, carried out during 1886-87 for the Medical Department, had for its object to investigate whether or no the disease, human scarlatina, is associated with the identical micrococcus, and whether this, if obtainable from the human subject, is capable of producing in the bovine species the same disease as was observed in the Hendon cows and in the calves experimented upon from the latter source. The definite and clear proof that this is really the case has now been obtained, and the evidence I now bring to the notice of the Royal Society.

On examining acute cases of human scarlatina—for which opportunity I owe great thanks to Dr. Sweeting, the Medical Superintendent of the Fulham Fever Hospital—I soon ascertained the fact that there is present in the blood of the general circulation a species of micrococcus, which on cultivation in nutritive gelatine, Agar-Agar mixture, blood serum, and other media, proved to be in every respect identical with that obtained from the Hendon cows. Out of eleven acute cases of scarlet fever examined in this direction, four yielded positive results: three were acute cases between the third and sixth day of illness with high fever temperature, and the fourth was a case of death from scarlatina on the sixth day. In all these four cases several drops of blood were used, after the customary methods and under the required precautions for establishing cultivations in a series of tubes containing sterilised nutritive gelatine, and generally only a very small number of these tubes revealed after an incubation of several days one or two colonies of the micrococcus. This shows that the micrococci were present in the blood in but small numbers.

Having ascertained the identity in morphological and cultural respects of the micrococcus of the blood of human scarlatina with the organism obtained from the Hendon cows, the action of the cultivations of both these sets of micrococci was then tested on animals and the results compared. It was found that mice—wild mice better than tame ones—after inoculation or after feeding, became affected in exactly the same manner, no matter whether the one set of cultivations or the other was used. The great majority of these animals died after between seven and twenty days; the *post-mortem* examination revealed great congestion of the lungs, amounting in some cases to consolidation of portions of the organ, congestion of the liver, congestion and swelling of the spleen, great congestion and general disease of the cortical part of the kidney. From the blood of these animals, taken directly from the heart, cultivations were established in nutritive gelatine, and hereby the existence of the same species of micrococci was revealed; they possessed all those special characters distinguishing the cultivations of the micrococcus of the Hendon cows, and of the human scarlatina.

In the third and concluding section of the work, cultivations of the micrococcus of two cases of human scarlatina were used for infecting calves: two calves were inoculated, and two were fed from each set of cultivations. All eight animals developed disease, both cutaneous and visceral, identical with that produced in the calves that had been last year infected with the micrococcus from the Hendon cows.

From the heart's blood of calves thus infected from human scarlatina the same micrococcus was recovered by cultivation, possessing all the characters shown by the cultures of the micrococcus of the Hendon cows, and of the cases of human scarlatina.

It must be evident from these observations that the danger of scarlatinal infection from the disease in the cow is real, and that towards the study and careful supervision of this cow disease all efforts ought to be directed in order to check the spread of scarlet fever in man. It is also obvious that in the agricultural interest investigations of this cow disease are greatly called for.

**Anthropological Institute**, February 22.—Mr. Francis Galton, F.R.S., President, in the chair.—The election of Mr. Joseph Straker was announced.—Prof. Ferrier read a paper on the functional topography of the brain. He discussed the question how far recent investigations into the functional topography of the brain could be brought into relation with craniological and anthropological researches with a view to establish the foundations of a scientific phrenology. Then he sketched the functional topography of the brain so far as it had been settled, but pointed out that the psychological aspects of brain functions were still far from being made out, although that correlation must be established and proved before a practical psychology, in any degree serviceable to the physician or the anthropologist, could be regarded as possible. He offered some speculations on the subject, and illustrated them by reference to certain facts and phenomena of disease in man. On the question as to how far it was possible from an anatomical examination of the brain to form an estimate of the forces and capacities of the individual, he pointed out many great difficulties which had to be encountered. *Cæteris paribus*, greater anatomical development might be considered as an index of greater functional capacity. He thought the attempt to determine differences in functional capacity from the examination of the head involved all the difficulties connected with the examination of the brain, and a great many more. He indicated the cranial relations of the principal convolutions, but expressed his belief that in the present state of our knowledge the data of a scientific phrenology were still very deficient. There was reason to believe, however, that, if the subject were taken up from different points of view by anatomists, physiologists, psychologists, and anthropologists, great progress might be made.—Mr. H. D. Rolleston read a paper on the cerebral hemispheres of an adult Australian; and a paper by Mr. Sören Hansen on a fossil human skull from Lagoa Santa, Brazil, was taken as read.

**Entomological Society**, February 2.—Dr. D. Sharp, President, in the chair.—The President nominated Mr. R. McLachlan, F.R.S., Mr. O. Salvin, F.R.S., and Mr. H. T. Stainton, F.R.S., Vice-Presidents during the Session 1887-88.—The Rev. W. J. Holland, Dr. F. A. Dixey, Mr. C. J. Gahan, and Mr. S. Klein, were elected Fellows.—Mr. P. Crowley exhibited a new species of *Synchloë*—*S. johnstoni*—from Kilima-njaro; also, for comparison, specimens of *Synchloë mesentina* and *S. hellica*, which the new species closely resembled.—Mr. W. White exhibited a number of preserved larvæ of European Lepidoptera in various stages of growth, illustrating the gradual development of the markings and colours, as explained by Prof. Weismann, in his "Studies in the Theory of Descent."—Mr. Gervase F. Mathew exhibited a variety of a female of *Lycæna telicanus*, from the neighbourhood of Gallipoli; some specimens of a *Lycæna* from Vigo, believed to be varieties of *Lycæna baton*; and several examples of a *Leucophasia* from Vigo, which appeared to be identical with *L. æstiva*.—Mr. Porritt exhibited, on behalf of Mr. N. F. Dobrée, a series of a remarkable red form of *Teniocampa gracilis*, bred from larvæ collected in Hampshire.—Mr. Eland Shaw exhibited specimens of *Pachytylus cinerascens* (Fab.), *Mecostethus grossus* (Linné), and *Gryllus flavipes* (Gmel.), and read a note on the identity of *Gryllus* (*Locusta*) *flavipes* (Gmel.).—Mr. H. Goss read a communication from Prof. Riley, of Washington, on the subject of the Australian bug (*Icerya purchasi*). It was stated that the insect had of late years become very destructive to various trees and shrubs in California, into which country, as well as into New Zealand and Cape Colony, it had been introduced from Australia.—The Rev. T. A. Marshall communicated a monograph of the British *Braconidæ*, part 2.—Mr. F. P. Pascoe read a paper entitled "Descriptions of some new species of *Brachycerus*."—Mr. Francis Galton, F.R.S., read a paper "On pedigree moth-breeding as a means of verifying certain important constants in the general theory of heredity," in which he suggested the institution of a system of experimental breedings, to be continued for several years, with the object of procuring evidence as to the precise measure of the diminution of the rate at which a divergence from the average of the race proceeds in successive generations of continually selected animals.—Mr. F. Merrifield read a paper entitled "A proposed method of breeding *Selenia illustraria*, with the object of obtaining data for Mr. Galton." Mr. McLachlan said he considered the fact that *S. illustraria* was dimorphic an objection to its selection for the experiments proposed, and suggested that the common silkworm moth would be more suitable. Prof. Meldola remarked that, although for some reasons the species selected was well adapted for testing Mr. Galton's conclusions, he believed that the fact of the moth being seasonally dimorphic was likely to introduce disturbing elements into the experiments which might influence the results. The discussion was continued by Dr. Sharp, Messrs. Baly, Kirby, White, Klein, Porritt, Dunning, Waterhouse, Bates, Merrifield, Galton, and others.

**Chemical Society**, February 17.—Dr. Hugo Müller, F.R.S., President, in the chair.—It was announced that the following changes in the Council list were proposed by the Council:—As President: Mr. W. Crookes, F.R.S., *vice* Dr. Hugo Müller, F.R.S. As Vice-Presidents: Prof. McLeod, F.R.S., Prof. Schorlemmer, F.R.S., and Mr. Ludwig Mond, *vice* Mr. Crookes, F.R.S., Prof. Liveing, F.R.S., and Prof. T. E. Thorpe, F.R.S. As ordinary Members of the Council: Prof. A. H. Church, Dr. P. F. Frankland, Prof. Kinch, and Dr. H. F. Morley, *vice* Messrs. H. T. Brown, A. E. Fletcher, and Profs. Meldola and Pickering.—The following papers were read:—The influence of temperature on the heat of dissolution of salts, by Prof. S. U. Pickering. This is an extension of the author's previous work on the sulphates, entitled "The Influence of Temperature on the Heat of Chemical Combination" (Trans., 1886, 260), which tended to show that the heat of dissolution of a salt does not increase regularly with a rise of temperature, but that irregularities occur at various points, so that the heat of dissolution must be represented by a series of curves. The experiments with potassium sulphate, hydrated and anhydrous magnesium sulphate, and hydrated and anhydrous copper sulphate have been repeated, and the investigation extended to potassium, sodium, hydrated and anhydrous strontium chloride, potassium and the two strontium nitrates, the two sodium carbonates, sodium acetate and potassium sodium tartrate. The investigation comprises over 700 determinations, the mean results with each salt being deduced from two to five distinct series of experiments, each performed with different thermometers. The observations extended from 3° to 25°. In all cases it was found that the irregularities previously noticed were the result of error, and that the heat of dissolution of a salt is represented by a series of straight lines. In rising from low temperatures the heat of dissolution is expressed by a straight line up to a certain point, when the rate becomes suddenly lowered and remains constant till a further sudden reduction occurs at some still higher temperature. The average divergence of all the mean results from lines of perfect straightness amounted to less than one-thousandth of a degree. . . . The heat of combination of a salt with its water of crystallisation is deduced from the author's results. He concludes that it is not a constant quantity at all temperatures; the general effect of rise of temperature being to diminish it, although at very low temperatures this effect seems to be more than counterbalanced by some other cause, probably the tendency of the water molecules to unite with each other, the heat of combination diminishing then with fall of temperature. The more water a salt contains the more marked are both these results.—Periodates, by Dr. C. W. Kimmins.—Sulphonic acids derived from the β-monohaloid-derivatives of naphthalene, by Prof. Henry E. Armstrong and Mr. W. P. Wynne.—The decomposition of potassium chlorate and perchlorate by heat, by Dr. Frank L. Teed.—The formation of ethylic cyanacetoacetate, by Dr. J. William James.—The relation of diazobenzene anilide to amidoazobenzene, by Mr. R. J. Friswell and Mr. A. G. Green.—Note on Wallach's explanation of the isomeric transformation of diazoamidobenzene into amidoazobenzene, by Prof. R. Meldola, F.R.S.

**Victoria Institute**, February 21.—Prof. T. McKenny Hughes read a paper on caves, their formation, uses as places of refuge, and the influences which in many cases cause uncertainty as to the ages of the deposits therein. In regard to English sea caves he held that our coasts had not recovered their present elevation, after the submergence that followed on the Glacial age, before man came on the scene, marine shells being found buried in the same earth as Palæolithic man and the extinct animals.

**Middlesex Natural History Society**, February 15.—Mr. Mattieu Williams in the chair.—Mr. Logan Lobley read a paper on the geology of the parish of Hampstead. Commencing with a sketch of the work of those distinguished geologists who have made Hampstead classic ground, Mr. Lobley referred especially to the work of the late Mr. Caleb Evans, and mentioned that Mr. Evans's well-known model of the area had passed into safe keeping. The London Clay was described in detail; its minerals, the nature of its clays, and the material manufactured from them, were treated of, as well as the sections, and the fossils they have yielded. Passing on to the Bagshot Sands, Mr. Lobley traced their age, their connection with similar beds of other districts, and the important part they play in the question of water-supply. Some remarks upon the formation of the present features of the area by denudation, and some interesting and suggestive notes upon the sources and direction of flow of the former smaller streams, such as the Fleet, the West Bourne, and the Bays Water, with a reference to the great folds of the Chalk, and the relation of the geology of London to that of the southern area, concluded the paper.

### EDINBURGH

**Royal Society**, February 7.—Lord Maclaren, Vice-President, in the chair.—Dr. E. Saug read a paper on cases of instability in open structures.—Mr. W. Peddie communicated a paper on the time-rate of increase of electrolytic polarisation.—Sir W. Thomson discussed the equilibrium of a gas under its own gravitation alone, and pointed out the bearing of the problem on the question of the probable age of the sun.—Dr. Ralph Copeland, of Dun Echt Observatory, communicated some astronomical notes.

**Royal Physical Society**, January 19.—Dr. Alexander Bruce showed some microscopic specimens tending to confirm Gower's views with regard to the existence of the ascending lateral tract in the spinal cord. His sections were taken from a case of meningomyelitis confined to the lower dorsal cord. They showed ascending degeneration of Goll's columns, of both cerebellar tracts, and of a comma-shaped tract in the situation of the ascending lateral tract of Gower's.—Dr. R. H. Traquair communicated the first part of a revision of the nomenclature of the fishes of the Old Red Sandstone of Scotland.—Mr. W. E. Hoyle read a report on a collection of shells brought from the West Coast of Africa, the Canaries, and Cape Verde Islands, by Mr. John Rattray.

**Mathematical Society**, February 11.—Mr. George Thom, President, in the chair.—Mr. W. J. Macdonald gave a proof of a geometrical theorem; Mr. A. Y. Fraser submitted a paper on vortices, by Mr. Charles Chree; Mr. R. E. Allardice communicated a note on a theorem in algebra, by Mr. John L. Mackenzie; Mr. George A. Gibson called attention to a point in the history of definite integrals; and Mr. John S. Mackay gave a few trigonometrical notes.

### CAMBRIDGE

**Philosophical Society**, January 31.—Prof. Babington in the chair.—On the motion of a ring in an infinite liquid, by Mr. A. B. Basset.—Form and position of the Horopter, by Mr. J. Larmor.—On the finer structure of the walls of the endosperm cells of *Tamus communis*, by Mr. Walter Gardiner. It would appear, from the author's more recent researches, that the perforation of the walls of the endosperm cells in the plant referred to is established after the formation of the wall, and in a similar manner to that which occurs in sieve-tubes during the formation of the sieve-plate. The author further hopes to show that this is a special instance of a general phenomenon.

February 14.—Mr. Trotter, President, in the chair.—On the influence of capillary action in some chemical decompositions, by Prof. Liveing.—On homotaxis, by Mr. J. E. Marr.—Note on the function of the secreting hairs found upon the nodes of young stems of *Thunbergia laurifolia;* on the petiolar glands of the Ipomœas; and on the occurrence of secreting grandular organs on the leaves of some Aroids, by Mr. Walter Gardiner. In the last paper the author remarked that it has been frequently stated that the entire absence of all extra-floral secretory structures in monocotyledonous plants furnishes one of the most striking points of difference between the above-named group and the Dicotyledons. One would be led to expect, however, that some form of secretive organ should be present, and that probably they would be found—if anywhere—among the Aroids. Guided by these considerations, the author made a careful examination of the Aroids at Kew, and was so fortunate as to find two individuals, viz. *Aglaonema Mannii* and *Alocasia cuprea*, which appear to him to possess definite organs of secretion. The structure of these organs was then shortly described, and a comparison was instituted between them and certain forms of extra-floral nectaries. As to the existence of intramural glands, *e.g.* in *Anthurium punctatum*, the author's observations confirmed those of Dalitzsch recently published in the *Botanisches Centralblatt.*

### LIVERPOOL

**Biological Society**, January 22.—Prof. W. Mitchell Banks, President, read his inaugural address, which dealt with the aims and objects of the Society.—Prof. W. A. Herdman read a paper on recent researches in connection with the vertebrate brain (the pineal eye in lizards, and the pituitary gland in the Vertebrata and Tunicata), and their bearing on the hypothetical protochordata.

February 12.—Prof. W. A. Herdman, Vice-President, in the chair.—Mr. A. O. Walker contributed some notes on the *Mysidæ* of Liverpool Bay, with a description of some abnormal specimens.—A paper was read by Mr. J. Lomas on some points in the structure of *Alcyonidium gelatinosum.*—The Secretary (Mr. R. J. Harvey Gibson) drew attention to the new English translation of Sachs's "Text-book of Botany," Book II., by Goebel, and made some remarks on the value of a uniform terminology for the reproductive organs, not merely in botany, but in biology generally.—Dr. Ellis contributed some notes on boring insect larvæ.—Dr. Larkin exhibited and described some physiological apparatus.

### PARIS

**Academy of Sciences**, February 28.—M. Gosselin, President, in the chair.—Remarks accompanying the presentation of MM. Charcot and P. Richer's work, "Les Démoniaques dans l'Art," by M. Charcot. Representations of persons "possessed by the devil," that is subject to epilepsy and other nervous affections, have been brought together from ivories, enamels, tapestries, engravings, paintings, and other sources, for the purpose of studying these works from the stand-point of scientific truth. Such masters as Andrea del Sarto, Domenichino, and Rubens are generally found to have depicted these subjects with a strict regard to nature, so that their figures accurately reproduce the traits of a now well-understood pathological state.—Determination of the constant of aberration: first and second method of observation, by M. Lœwy. The author here deals with the somewhat feeble part played by refraction in these already described processes. From this study it appears that, the action of refraction being at all altitudes the same, the measure of the distance (except for very low regions) may be everywhere effected under almost identical conditions of accuracy. Hence it is no longer necessary to observe the two stars only when found at considerable altitudes, a circumstance which greatly facilitates compliance with the other geometrical conditions of the problem.—On the great movements of the atmosphere, in connection with M. Mascart's last note of February 21, by M. Faye. The author reviews the whole subject of aërial movements as bearing more especially on his well-known theory regarding the direction of the wind in cyclones. The paper is followed by a brief reply from M. Mascart, who still maintains that this theory is unsupported by observation.—Note on the measurement of the photographic plates of the transit of Venus across the solar disk in 1882, by M. Bouquet de la Grye. These measurements, which have been executed in the Institute, deal altogether with 1019 plates, involving lengthy calculations which cover no less than 32,000 sheets of paper.—On the phosphorescence of the sulphuret of calcium, by M. Edmond Becquerel. In connection with M. Verneuil's recent paper on the determining causes of the phosphorescence of the sulphuret of calcium, the author makes some observations on the views already announced by him on the influence of foreign substances in modifying the molecular condition of the sulphuret of phosphorescent calcium.—On the red fluorescence of alumina, by M. Lecoq de Boisbaudran. It has recently been shown that highly calcined alumina yielding a bluish fluorescence *in vacuo* assumes a red tint in the phosphoroscope. Notwithstanding this observation the author still contends that the presence of chromium is necessary to obtain the red fluorescence of alumina. A mere trace of $Cr_2O_3$ superadded suffices to produce the fine fluorescence described by M. Becquerel in his work on "Light."—Note on the earthquake of February 23 at Marseilles Observatory, by M. E. Stephan. The movement which was attended by such disastrous effects along the Riviera, and even in the Maritime Alps, was very little felt at Marseilles, where two series of shocks were recorded at the Observatory, the first at 5.55 in the morning, and lasting about 90 seconds, the second ten minutes later, and lasting only some 15 seconds. The astronomic pendulums were somewhat disturbed, but the meridian-circle was not appreciably affected.—Observations of Barnard's new comet (1887 *d*), and of Palisa's new planet 265, made at the Paris Observatory (equatorial of the West Tower), by M. G. Bigourdan.—On a new method of determining the parallax of the sun by the photographic observation of the transit of Venus, by M. Obrecht. The method here described yields formulæ by means of which the parallax may be determined from the observations of *a single station*.—Additional note on the measurement of aberration, by M. J. C. Houzeau. It is shown that the objections recently raised by M. Lœwy to the author's method rest on a serious error.—On applicable surfaces, by M. E. Amigues. A definition is given of rectilineal applicable surfaces, from which several theorems are deduced.—On the product of two sums of eight squares, by M. X. Antomari. A fresh demonstration is given of the theorem that the product of two sums of eight squares is a sum of eight squares. It is further remarked that by means of this theorem a rule of multiplication of complex quantities in a space of eight dimensions may be conceived analogous to the rule of multiplication of quaternions.—Note on entropy, by M. Félix Lucas. It is shown on theoretical grounds that when a gas is heated under a constant volume or under a constant pressure, the increase of its entropy is in proportion to the increase of its true temperature.—On the coefficients of chemical affinity, by MM. P. Chroustchoff and A. Martinoff. Certain analytic and thermic experiments are described, from which it is inferred that neither the initial nor the final composition of precipitates can serve to give coefficients of chemical affinity. Characteristic constants of affinity cannot be evolved by the method of simultaneous precipitation.—The action of heat on heptene, by M. Adolphe Renard. From the experiments here described, it follows that under the influence of heat heptene is decomposed chiefly into toluene and hydrogen, at the same time yielding a certain quantity of its lower homologues, hexene and pentene.—On the special characters of the loss of activity experienced by diastase under the action of heat, by M. Em. Bourquelot. A series of experiments are described, from which it would appear that the quality of the fermentation is modified rather than its quantity diminished, unless it be admitted that in natural diastase there are two or more soluble ferments intermingled, which by the increase of temperature become successively destroyed.—On the earths of cerite, M. Eug. Demarcay.—On the ferrite of zinc, by M. Alex. Gorgeu. Several methods are described for easily preparing this substance, and comparing it with the natural ferrite known as franklinite.—On the nitrates and superphosphates, by M. A. Andouard. The author's experiments show that it is a mistake to mix these substances together as artificial manures.—On the destruction of the Nematodes of beetroot, by M. Aimé Girard. The sulphuret of carbon is proposed as a more practical remedy than the expensive system of "decoy plants" (*plantes pièges*) introduced by Kühn.—On the cause of the changes which take place in the blood on contact with air, oxygen, and carbonic acid, by M. A. Béchamp. These changes are referred to the activity and influence of the microzymes of the blood.—On the transfusion of blood into the head of decapitated animals, by MM. Hayem and Barrier. It is argued that the assertions contained in M. Laborde's recent communication on this subject are not justified by his own publications.—On the gastric glands secreting mucus and ferment in birds, by M. Maurice Cazin.—On the structure of the muscular fibres in the edriophthalmous crustaceans, by M. R. Kœhler.—On the anatomy of Bilhazia (*B. hæmatobia, Distomum hæmatobium*), by M. Joannes Chatin.—On the geology of the Lake Kelbia district and of the Central Tunisian seaboard, by M. G. Rolland. From his extensive studies of this region the author concludes that during the historic period the relief of the land has not perceptibly changed, and that in the Roman epoch as well as now Lake Kelbia communicated only intermittently with the sea.—On the deposits of tin, from the geological stand-point, by Mr. Reilly. Excluding those of Mexico and Bolivia, the author argues that all these deposits, from Cornwall to Australia, are connected by a vast curve, which he calls the "axis of Sumatra."—On some new methods of artificially producing crystallised silica and orthose, by M. K. de Kroustchoff.—On the earthquake of February 23, recorded at the Perpignan Observatory, by M. Fines. As at Marseilles, the vibrations were but slightly felt in this district.—On the effects of the same earthquake in East Switzerland, by M. F. A. Forel. The main shock appears to have been very generally felt throughout this region.—Papers followed describing its effects at Nice, Voreppe (Isère), and Saint-Tropez, and discussing the relations that may exist between seismic and magnetic disturbances.

### BERLIN

**Physiological Society**, January 28.—Prof. Du Bois-Reymond in the chair.—Dr. Benda mentioned that his researches, according to which the "spermatoblasts" resulted from the coalescing of the cells forming the spermatozoa with the supporting cells, had some years earlier been anticipated by the French anatomists, and that Prof. Grünhagen, who formerly opposed this view, was now likewise presenting it as his own.—Dr. Rawitz had examined the green gland of fresh-water crayfish. It was situated on the first member of the antennæ, was uniformly green on the ventral side, but on the dorsal side only at the periphery, elsewhere white, with a round yellow-brown speck in the centre. The gland consisted of two tubules closely interwoven. The cells of the green part had a round grass-green drop of protoplasm, the yellow-brown cells a uniformly yellow-brown coloured nucleus. The tubules anastomosed, the yellow-brown cells being the terminal portions of the tubules, and secretory. No conclusions respecting the function of the glands could be drawn from their anatomical structure.—Dr. Gad made a communication respecting the peculiar strange albumen-precipitate with salt recently described by Dr. Wurster. If to the white of eggs lactic acid, peroxide of hydrogen, and common salt were added, almost the whole of the albumen was precipitated as a white flaky mass, perfectly similar in appearance and taste to newly-precipitated caseine (curd), but distinguished from caseine by its chemical reactions. The easy digestibility of this form of albumen, which had hitherto been precipitated by no other reagent was especially remarkable. It was interesting that, in accordance with the reactions shown by Dr. Wurster's test paper for active oxygen, hydrochloric acid was formed on the mixture of lactic acid, peroxide of hydrogen, and common salt, and this acid *in statu nascendi* might be the specific precipitate for this new form of albumen, which could be obtained just as well from blood serum as from white of eggs.

**Meteorological Society**, February 1.—Prof. von Bezold in the chair.—Dr. Frölich gave a report on measurements of solar heat, which, following up those instituted in 1883 and already published, he had made in the years 1884 to 1886 after some alterations in his apparatus. The most important modifications made in the apparatus consisted in the removal of the rock-salt plate in front of the thermo-electric pile which he had made use of in his first measurements. He had been induced to remove the rock-salt plate by the conviction that after a time rock-salt developed a quality of transmissibility which was not identical both for luminous and for non-luminous heat. The bare thermo-electric pile showed itself by oft-repeated proofs to be constant towards the rays of a Leslie cube. The relation of the rays from the blackened side of the cube to the rays from the white side continued invariably the same. The same constancy was manifested in the registrations of the thermal element towards the luminous heat of a white-glowing platinum chimney, which was uniformly heated by two gas-flames. The observations of solar heat were made on perfectly bright days and under a perfectly clear atmosphere, the thermo-electric pile being directed to the sun under very different heights, as far as 10°, and exposed to the sun till the diversion of the galvanometer had become constant. The values obtained on the various days and under different solar positions were graphically delineated, on the supposition that the absorption of the atmosphere was an exponential function of its density. The result came out that the "curve" was practically a straight line, or a line concave or convex to so small a degree as to deviate but very little from a straight line. When the curve was lengthened till it met the perpendicular co-ordinate, then the intersecting point representing the magnitude of the solar heat was the same for all days of observation. The deviating results of Mr. Langley and Messrs. Angot and Crova were explained, in part from the fact that in their calculation the reflection of the thermal rays in the different atmospheric strata had not been taken account of, and in part from the fact that the different atmospheric strata were assumed to be parallel, and so their incurvation was left out of account. Notwithstanding the circumstance that the absorption by the atmosphere was different for the different kinds of rays, and also different from day to day, yet was the "curve," the co-ordinates of which were represented by the observed heat and the abscissæ by the logarithms, without exception, a straight line. This empirically ascertained fact was the main result of the whole series of investigations extending over three years.

**Physical Society**, February 4.—Prof. Helmholtz in the chair.—Dr. Sprung described the barograph designed by him, which avoided the errors of the older balance-barometer (first constructed in 1760 by Samuel Moreland) by making the barometer work on a resting horizontal beam, which through horizontal automatic displacement of a sliding weight was kept always in exact equilibrium. The travelling vertical tread-wheel constantly marked its position on the writing-table of the instrument. Seeing, moreover, that this displacement of the tread-wheel was effected by a clockwork, any disturbance that might arise from its rubbing against the barometer was completely precluded. The automatic equilibration of the beam of the balance was produced by an electric current. The speaker had quite recently instituted a series of the most various experiments, by which he demonstrated how the registering balance designed by him was with great advantage available for a large number of physical investigations: how, for example, he was able by his balance to permanently register the state of the quicksilver in the barometer; the progress of the evaporation of alcohol; the discharge of a fluid from a capillary tube; the change of intensity in an electric current; the evaporation of water through a clay-ball; the changes of density in the atmospheric air recorded by the variations of rise on the part of a large glass ball; and phenomena connected with permanent change of weight. The registering balance, which was being executed by the mechanician Fues in Berlin, allowed, in short, a large series of physical processes to be automatically recorded, and would prove highly useful in many physical investigations.—Prof. Helmholtz, by an experiment, demonstrated the great cohesion of an air-free column of water. A siphon-shaped glass tube, the longer leg of which was closed and the shorter one open, was filled with quicksilver, and above the quicksilver there was superposed a small quantity of distilled water. If the filling was effected without admission of air, then, on the tube being placed in an upright position, the water adhered to the closed end, and its adhesion supported the quicksilver column, which was longer than the barometer height. The speaker now brought the open end of the siphon tube into communication with an air-pump, and caused to be pumped out as much as down to 2 mm. pressure, but even then the cohesion of the water supported the quicksilver column. Only by shaking was the water column shattered, and the quicksilver immediately sank. If there was no shaking, the apparatus continued for an unlimited length of time unchanged. This contrivance should serve the purpose of electrolysing air-free water and ascertaining the strength of the current under which gas bubbles developed themselves by electrolysis. The experiment showed that on the transmission of a current of 2 volts the water continued adherent. The depression of the quicksilver column in consequence of gas development occurred, however, in an experiment with a current of 2·15, and in another with a current of 2·18 volts.

February 18.—Prof. Schwalbe in the chair.—Dr. Frölich spoke of his measurements of the solar heat in the years 1883, 1884, and 1886, and refuted at length the objections which had been raised against these measurements by MM. Vogel, Langley, Angot, and Crova. In the discussion following thereon, Dr. König stated that experiments carried out in the Physical Institute with a Langley bolometer indicated that very considerable influence is exercised by the air-currents on this delicate measuring-instrument.

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## BOOKS AND PAMPHLETS RECEIVED

Catalogue of the Fossil Mammalia in the British Museum, Natural History, part iv.; R. Lydekker.—Practical Electricity: W. E. Ayrton (Cassells).—A Treatise on Algebra: Profs. Oliver, Wait, and Jones (Finch, Ithaca).—Contributions to Meteorology, chap. ii. revised edition: E. Loomis (New Haven).—The Game of Logic: L. Carroll (Macmillan).—Bees and Bee-keeping, vol. ii. parts 5 and 6: F. R. Cheshire (U. Gill).—British Dogs, parts 2-5: H. Dalziel (U. Gill).—Fancy Pigeons, 3rd edition: J. C. Lyell (U. Gill).—Vegetable Biology: Dr. T. W. Shore (Churchill).—Anecdota Oxoniensis; Alphita: edited by J. L. G. Mowat (Clarendon Press).—Journal of the Anthropological Institute, February (Trübner).—Outlines of Lectures on Physiology: T. W. Mills (Drysdale, Montreal).—Schools of Forestry in Germany: Dr. J. C. Brown (Oliver and Boyd).—Social History of the Races of Mankind, 2nd division: A. Featherman (Trübner).—Complete Hand-book on the Management of Accumulators, 2nd edition: Sir D. Salomons (Whittaker).—The Encyclopædic Dictionary, vol. vi. part 1 (Cassells).—Journal of the Chemical Society, March (Gurney and Jackson).—Bulletin of the American Geographical Society, Nos. 4 and 5, 1885 (New York).—Annual Report of the Proceedings of the Sussex Association for the Improvement of Agriculture, 1886.—Journal of the Asiatic Society of Bengal, vol. lv. part 2.—Aborigines of Hispaniola: H. Ling Roth (Harrison).—Bibliography and Cartography of Hispaniola: H. Ling Roth.

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